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# A search for heavy neutral gauge bosons and dark-sector particles with the ATLAS detector

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We present a search for a new neutral vector boson ($Z'$) produced in association with dark states that do not interact via the Standard Model interactions. The search is performed using proton-proton collisions at $\sqrt{s} = 13$ TeV corresponding to an integrated luminosity of 140 $\text{fb}^{-1}$ recorded by the ATLAS detector at the Large Hadron Collider. The $Z'$ boson is assumed to decay to a pair of same-flavour light leptons ($e^+e^-$ or $\mu^+\mu^-$), while the dark particles escape detection, meaning that the targeted experimental signature is a resonance in the dilepton invariant-mass spectrum and large missing transverse momentum.

Two signal benchmark models, referred to as dark-Higgs and light-vector, are used to optimise the search, and a set of signal regions are defined as bins in the $E_T^{miss}$ significance variable. The results of the search are obtained by scanning across the dilepton invariant-mass spectrum in each signal region. No significant excess over the Standard Model prediction is observed. Cross-section limits are set on the considered benchmark scenarios, and on the coupling of the $Z'$ to leptons, for $Z'$ masses between 200 GeV and 1 TeV.

The signal benchmarks used for the search are not required to reproduce the observed dark-matter relic density, and some additional studies are performed to evaluate the potential for tuning the models to yield realistic relic density predictions. We also consider the impact of constraints from other relevant searches on the models, and discuss planned extensions of the search and its interpretations, for example in terms of more model-independent exclusion limits.

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